National Park Service
U.S. Department of Interior

Joshua Tree National Park
Twentynine Palms, California

Environmental Assessment

New Interpretive Trail at Skull Rock Day Use Area
Joshua Tree National Park, Twentynine Palms, California

Contents

Chapter 1 - Purpose and Need

1.1 Introduction

Under the authority of the 1906 Antiquities Act, Joshua Tree National Monument was established as a unit of the national park system by Presidential Proclamation No. 2193 on August 10, 1936 (50 Stat. 1760) because its "lands contain historic and prehistoric structures and have situated thereon various objects of historic and scientific interest . . . it appears that it would be in the public interest to reserve such lands as a national monument, to be known as the Joshua Tree National Monument." While the language in the presidential proclamation indicates a strong cultural resource emphasis, the legislative history reveals that another major reason for the establishment of the monument was the preservation of the natural resources of the Colorado and Mojave deserts. The natural resource preservation emphasis was so strong that the original name contemplated for the monument was Desert Plants National Park (NPS 1995).

In 1950, Public Law 81-837, 64 Stat. 1033 reduced the size of Joshua Tree National Monument from approximately 860,000 acres to 560,000 acres, and revised the boundaries. Public Law 103-433 added 234,000 acres to Joshua Tree National Monument and changed its status from national monument to national park in 1994. The land that was added by the legislation comprises primarily backcountry and wilderness areas. In 1995, NPS adopted a general management plan to administer the developed zone of the former national monument.

Of the park's 794,000 acres, 595,320 acres are legislated wilderness—set aside for the preservation of natural, cultural, historic, and scenic resources. The compressed ecosystem transition zone between the Mojave and Colorado deserts makes it possible to cross from one desert to the other within less than 65 miles. The park contains all or portions of numerous mountain ranges, including the San Bernardino, Cottonwood, Hexie, Pinto, Coxcomb, and Eagle ranges. The eastern portion averages 2,000 feet above sea level, while the western half is mostly above 4,000 feet. Extremes in elevation range from 1,000 feet at Pinto Well to 5,900 feet at Quail Mountain. Major valleys include the Pinto Basin, Juniper Flats, Covington Flats, Pleasant, Queen, and Lost Horse.

Through the NPS Organic Act (1916), Congress set forth the purpose of the national park system, which is "to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such manner and such means as will leave them unimpaired for the enjoyment of future generations" (16 United States Code [USC] Sec.1).

Based on enabling and wilderness legislation, legislation of October 1994, and biosphere reserve status, the purposes of the park are to:

• protect and interpret areas, sites, structures, and various artifacts associated with occupations by prehistoric, historic, and contemporary Native American groups, historic miners, and subsistence cattle ranchers

• protect and interpret the biologically diverse examples of the Mojave and Colorado Desert ecosystems

• serve as a natural laboratory for understanding and managing the Mojave and Colorado Desert ecosystems

• preserve the character and values of wilderness in the park

• provide visitors with opportunities to experience and enjoy natural and cultural resources through compatible recreational activities

Joshua Tree National Park is considering the construction of a new pedestrian trail to enhance the recreational, educational and interpretative opportunities at Skull Rock. The new trail will consist of a loop trail beginning and terminating at the Skull Rock parking area. The project will include the extension of an existing trail beginning at the Skull Rock parking area. The 7/10 of a mile trail will pick up at the end of the existing trail and will loop back to the parking area while traversing over several new scenic vantage points. One of the main goals of this project is to funnel trail use –at this highly visited area- into single track closed loop. The area is highly impacted by off trail use (social trails) that is impacting the natural resources.

This environmental assessment evaluates three alternatives: 1) a No-Action alternative, 2) an Action alternative with trail development and 3) an Action alternative that includes trail development and installation of a viewing telescope and placards or educational exhibits to enhance the educational experience.

This environmental assessment has been prepared in compliance with the 2006 Management Policies and National Environmental Policy Act (NEPA) to provide the decision making framework that: 1) analyzes practical range of alternatives to meet the project purpose and needs, 2) evaluates any measurable impacts to cultural and natural resources, and 3) identifies any mitigation measures to reduce the degree or extent of measurable impacts.

A visitor survey conducted in November of 2010 revealed that more than 62% of visitors surveyed, included walking along self-guided nature trails as part of their activities while at the park. The Skull Rock area is a prime location for developing an easily accessible self-guided trail, with a large parking area to accommodate numerous visitors. While the main intent of the new trail is centered on providing school aged children an easily accessible nature trail, visitors of all ages will benefit from this project.

If you wish to comment on this environmental assessment, you may mail comments to the name and address below. This environmental assessment will be on public review for 30 days. Please note that the names and addresses who comment will be a part of the public records. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations, business and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

Please address comments to:

Superintendent
Joshua Tree National Park
Attn: Skull Rock Interpretative Trail
74485 National Park Drive
Twentynine Palms, CA 92277

You may also email your comment to: JOTR_Superintendent@nps.gov Please reference “Skull Rock Trail” in the subject line.

1.2 Project Location

The proposed project is located at the Skull Rock area approximately 7 miles from the north entrance station (18 miles from the west entrance station.) The large parking area can easily accommodate 20 cars or a school bus and approximately 14 cars. Access to the trail is from the northerly side parking area.

1.3 Purpose and Need

The purpose of the proposed project is to enhance the visitor experience by offering an educational nature walk trail adjacent the Skull Rock parking area. The main focus of the new trail is directed toward school aged children offering an easy walking trail through a diverse setting. The trail loop is approximately 7/10 of a mile in total length and is designed to offer a variety of easily navigable terrain settings. Joshua Tree National Park (Park) has more than 280 miles of trails. The variety and complexity of the tail network offers everything from easy less than a mile walks to multi-day strenuous hikes through the back country of the park. Less than 2 percent of the trail network within the park is considered easy with easy access and less than a mile in length. Additionally, this action will restore numerous visitor created social trials from the parking area and funnel use to the new trail releasing the desert natural areas from continual disturbance. There are currently 107 off-trail tracks or paths. These are more commonly referred to as "social trails" and are the result of shortcuts around designated routes.

1.4 Scoping

Scoping is the process of identifying resources that may be affected by a project proposal, and to exploration of possible alternatives for achieving the proposals objectives while minimizing adverse impacts. The Park conducted internal scoping with appropriate NPS staff to identify potential issues, impact topics, and alternative ways to meet project needs, during the late summer and fall in 2014. The State Historic Preservation Officer was notified of the undertaking in July, 2014. The Park conducted external scoping with the public and interested/affected groups without any comments being received, during the summer of 2014.

1.5 Impact Topics

NPS policy requires that all proposed projects be screened for potential impacts against a list of natural and cultural resource categories. Park management used an interdisciplinary review process to determine which resources could be affected by this project.

NEPA requires that agencies consider whether a number of different possible issues require a detailed analysis as impact topics. Impact topics are resources of concern that could be affected, either beneficially or adversely, by implementing any of the proposed alternatives. Impact topics were identified by the park's interdisciplinary review during the completion of the Environmental Screening Form. The Public Service Announcement did not result in any comments from the public.

Identification of topics to be analyzed:

Air Quality:
The Federal 1970 Clean Air Act stipulates that Federal agencies have an affirmative responsibility to protect a park's air quality from adverse air pollution impacts. The park is a Class I area for air quality standards. Trail construction impacts on air quality would be limited to short term effects including the temporary introduction of particulates into the environment. However, since the park is a Class I area for air quality standards, regardless of the short term impacts mitigation measures will need to implemented to reduce measureable impacts. Therefore, impacts to air quality are analyzed in this Environmental Assessment (EA).

Soils:
Soils can be adversely affected during trail construction as well by heavy trail usage resulting in erosion and compaction. Therefore, impacts to soils are analyzed in this Environmental Assessment (EA).

Vegetation:
Portions of the proposed trail which are new pass through three vegetation alliances: California Juniper /Blackbrush alliance (62%), Desert Willow alliance (21%), and Catclaw Acacia-Desert Willow association (17%). Additionally, the park has a known state listed rare plant, Coryphantha alversonii (Foxtail cactus) that occurs in the vicinity of the proposed trail. Installation of the trail through these undisturbed locations may negatively impact the vegetation resources and therefore vegetation will be included for analysis in this EA.

Wildlife:
The proposed action has the potential to affect wildlife habitat within and adjacent to the project area. The installation of the trail in a relatively undisturbed area may include habitat disturbing activities including incidental death or injury to park wildlife.

Federally Listed Species and Species of Special Concern:
The proposed action may affect a federally listed species as well as species of special concern found within and adjacent to the project area. The Endangered Species Act (ESA) of 1973, as amended, requires an analysis of impacts on all federally listed threatened and endangered species. One federally listed species is known to occur within the project area, the desert tortoise (Gopherus agassizii; Mojave

population). This species and its critical habitat, as well as species of special concern, are likely to be affected by construction of the proposed action; therefore, federally listed species, critical habitat, and species of special concern are addressed as an impact topic in this EA.

Visitor Use and Experience:
The 1916 Organic Act directs the NPS to provide for public enjoyment of the scenery, wildlife and natural and historic resources of national parks "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." The installation of a new trail will involve activities (new ground disturbance and disturbance of native vegetation) that may be considered inconsistent with the Parks purpose and the Organic Act. However, the beneficial impacts associated with the project may also occur. Therefore, impacts to visitor use and experience will be analyzed in this EA.

Cultural Resources (Cultural Landscape, & Archeology):
Section 106 of the National Historic Preservation Act of 1966, as amended, provides the framework for Federal review and protection of cultural resources, and ensures that they are considered during Federal project planning and execution.

Impact topics not retained:
The topics listed below were dismissed from further analysis as a result of being identified during the internal scoping process as not affecting the environment as it is not being affected by implementing any of the proposed alternatives.

Environmental Justice:
Executive Order 12898 requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs or policies on minorities and low-income populations and communities. The plans evaluated in this EA would not adversely affect socially or economically disadvantaged populations.

Socioeconomic:
The National Environmental Policy Act requirements include an analysis of social and economic impacts caused by federal actions. The economics of the nearby communities of Yucca Valley, Joshua Tree, and Twentynine Palms would not be affected by the park's proposed trail.

Park Operations:
The realigning of the trails is not expected to alter the amount of visitation so no impacts to visitor services are expected. The trail mileage of all the alternatives is similar to the current total trail length. Therefore, no impacts to trail maintenance operations are expected. As a result no changes are expected to occur from the implementation of any action alternatives, so this topic is dismissed from further analysis.

Floodplains:
Presidential Executive Order 11988 mandates floodplain management. To implement the Executive Order the NPS has developed Procedural Manual 77-2: Floodplain Management. Within that manual it

identifies excepted actions. This project falls under an excepted action. The placement of foot trails in the floodplain that are considered non-high hazard areas, provided that the impacts of the facilities on floodplain values are minimized, is an excepted action.

Wetlands:
Presidential Executive Order 11990 mandates protection of wetlands. This project fall under the excepted activities listed in the Directors Order 77-1 Procedural Manual (National Park Service, 2012), the manual that defines how the Executive Order is to be implemented on NPS lands. The project does not have the potential to impact wetlands as described in Presidential Executive Order 11990. The Park contains 10 acres of wetlands adjacent three oases, none of which are adjacent to the proposed project. As a result, wetlands will not be analyzed in this EA.

Cultural Resources:
Museum collections, archives, cultural landscapes, and oral histories are not considered in this analysis. The proposed actions have no potential to affect museum collections, archives, or oral histories. No inventoried cultural landscapes exist within the defined area of potential effect, and the surrounding area has little potential to yield cultural landscapes with significance or integrity.

Chapter 2 – Alternatives

2.1 Alternatives Considered and Analyzed in this Environmental Assessment:
NEPA requires federal agencies conduct a careful, complete, and analytical study of the impacts resulting from proposals that have the potential to affect the environment, and to consider alternatives to those proposals, well before any decisions are made. This section describes the three alternatives considered, including the No-Action Alternative. Following a description of the alternatives, is a discussion of the environmentally preferable alternative and preferred alternative. In addition to presenting the alternatives considered in this EA, a brief description of the current trail system in the park is presented below.

Existing Trail System Overview:
Joshua Tree National Park has approximately 285.9 miles of trails. Trails within the park are ranked by the physical requirement necessary to complete the journey. Trail ranking includes: easy, moderate, moderately strenuous, and strenuous with a few trails ranked as variable (e.g. easy to strenuous). While most of the trail system transitions front country areas to backcountry a few trails lie deep within the back country areas. Most trails are accessed via roads in non-wilderness areas.
All trails within the park are maintained by the both permanent and seasonal trails crews and by youth groups during the summer season. Trail repair is conducted on an as-needed basis and on a cyclic maintenance schedule. Trails are reviewed after periods of high precipitation or seasonal flooding events to maintain safety standard or to temporarily close trails in need of repair.

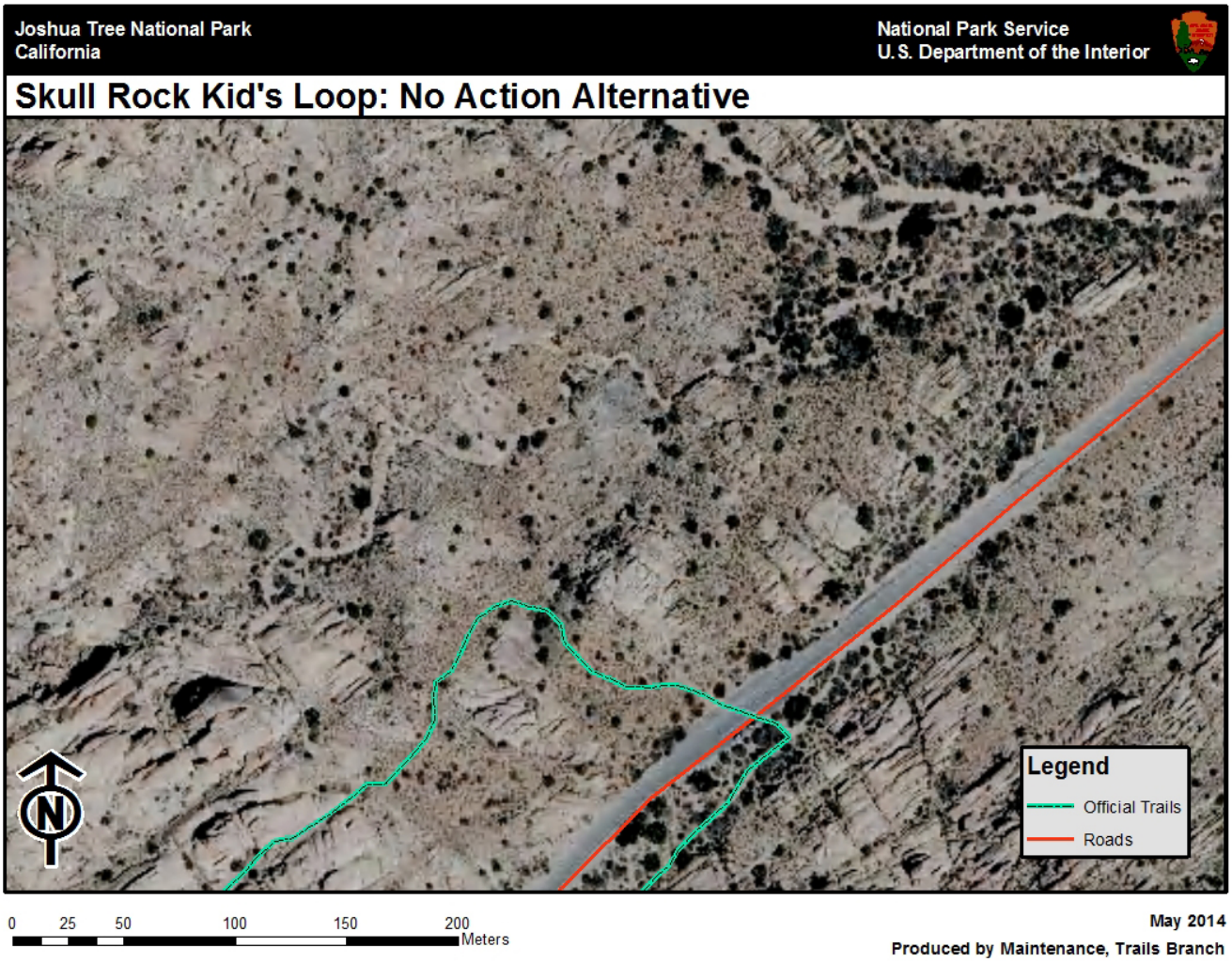
Description of Existing Trails:
Of the 285.9 miles of trails in the park, 1.5% of the trails are ranked as easy and less than one mile; 20% ranked easy and more than a mile. For the remainder of the trail system greater than a mile, 23.3% rank moderate; 32.3% rank moderately strenuous; 5.3% rank strenuous; 17.4 % rank variable (easy to strenuous). Presented below is a summary of trails within Joshua Tree National Park.

Easy Trails	< 1Mi		Moderate trails	Mi		Moderate Strenous	Mi		Strenous Trails	Mi		Variable Trails (E to S)	MI
Cactus Cove View (OW)	0.2		High View Loop	1.3		Canyon View Trail (OW)	1.6		Eureka Peak Trail (OW)	5.2		CA RHT (OW)	37
Botanical Walk Loop	0.2		Mastodon Peak Loop	3		Cliff Trail (OW)	1.7		Berdoo/Thermal (OW)	10		Bigfoot Trail	12.7
Keys View Loop	0.3		Burro Loop	3.5		Ryan Mountain (RT)	3.0						
Cholla Gardwn Loop	0.3		Johnny Lang Conn. Tr	1.8		Fortynine Palms (RT)	3.0		Total	15.2		Total	49.7
Bajada Trail Loop	0.3		Covington Loop Tr	3.95		Contact Mine Tr. (RT)	3.4						
Nolina Cove Trail (OW)	0.3		Short Loop/ Fault Tr	4.9		Rocky View Loop	5.1						
Arch Rock Loop	0.3		Fault Trail	4.3		Maze Loop	4.9						
Cap Rock Loop	0.4		Morrongo View Loop	5.3		Window Loop	5.7						
Oasis of Mara Loop	0.5		Deerhorn Trail (OW)	2.65		North View (OW)	3.3						
South Side Conn. (OW)	0.5		Stubbe Springs Tr. Loop	6.5		Panprama Trail (OW)	3.3						
North Entrance (OW)	0.5		Lost Palms Oasis (RT)	7.5		Ryan/Johnny Land (OW)	4.6						
Indian Cove Loop	0.6		Squaw Tank (OW)	4.2		West Side Loop Tr	5.1						
Total	4.2		Ryan Mountain Tr. Loop	9.75		Black Rock Cyn Loop	6.2						
			Boy Scout Tr. (OW)	8		Lost Horse Loop	6.2						
Easy Trails	> 1Mi		Total	66.65		Hexedron Mine Tr. (OW)	8.0						
North Side Access (OW)	0.7					Long Cyn./ Chuck B. (OW)	8.5						
Hidden Valley	1.0					Pushwalla Cyn Cor. (OW)	12.0						
Cottonwood Springs	1.0					Lucky Boy/Queen Mine	6.8						
Mary Trail	1.0					Total	92.3						
Lost Horse Well Rd	1.0												
Barker Dam Loop	1.1												
North and South Side	1.1												
Little Long Cyn	1.2												
Wall Street Mill (RT)	1.5												
Skull Rock Loop	1.7												
Covington Crest (OW)	1.7												
West Access TR	1.7												
Samuelson West (OW)	1.8												
North Side Trail (OW)	1.8												
Lost Horse Valley (OW)	2.5												
Boundary E & W (OW)	2.5												
Burnt Hill Trail (OW)	2.8												
Pine City Trail (RT)	3.0												
Cap Rock trail (EW)	3.0												
Old Lost Horse (OW)	5.0												
Old Queen Valley (OW)	6.0												
Willow Hole (RT)	7.0												
Quail Springs Historic	7.8												
Total	57.9												
RT= Round Trip													
OW= One Way													

Alternative 1: No Action

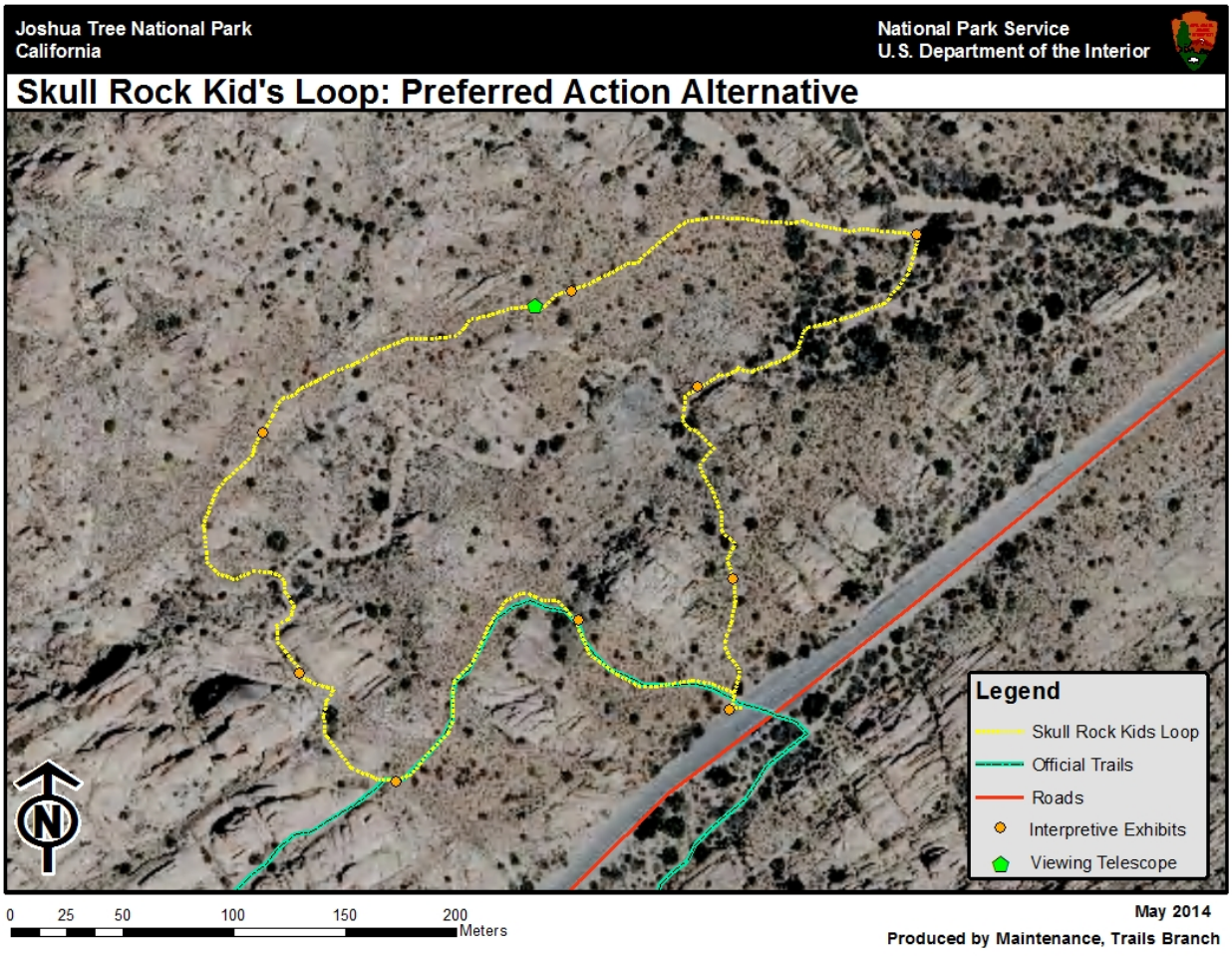
The existing trail would remain unchanged along the current trek. The current length of the (XXmiles) will also remain unchanged. Trail maintenance would continue as currently planned in the General Management Plan (1993).

Presented below is an image of the No-Action Alternative. The image depicts the current condition of the Skull Rock area and existing trail.



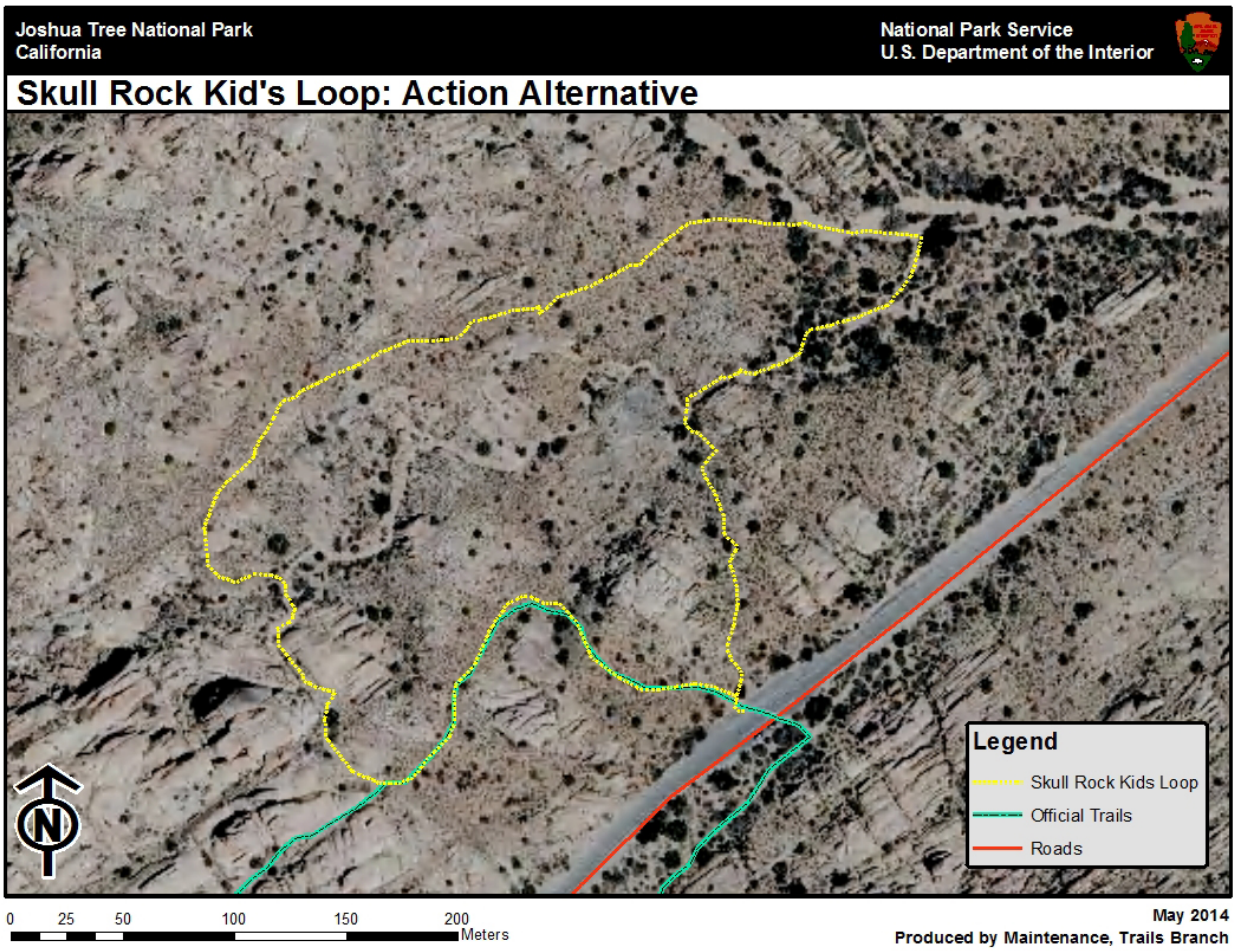
Alternative 2: (Preferred Alternative)
Under the preferred alternative the existing trail at Skull Rock would be modified with the addition of 6/10 of a mile of new trail surface (tread). The tread would consist of approximately 24 inches of new surface. Where necessary rock and soil would be removed to flatten the tread and in other locations soil would be filled to even out low or undulating surfaces. The 6/10 of a mile new tread would occur in an area previously undisturbed except for social trailing (off trail visitor use). The new length of trail would loop back to the parking area completing the loop near the beginning of the existing trail. Under this alternative wayside exhibits would be strategically placed, offering educational information in addition to a 360 degree view-scope.

Near the parking area signage may be place directing visitors and or large groups to the trail loop access point. Ancillary to installation of the trail, it is anticipated that the new trail within this highly visited area will reduce the amount of social trailing that currently exists in this area.



Alternative 3: Action Alternative without Exhibits

Under this alternative the existing trail would be modified with the installation of a 6/10 mile loop as proposed in the Preferred Alternative. However, this alternative would omit the installation of any interpretative or educational exhibits. Additionally, the 360 degree view-scope would also not be installed. The intent of this alternative is to install the new trail system with minimal impact to the natural viewshed. Similar to the Preferred Alternative one of the ancillary benefits of constructing the trail is the reduction of social trailing that is currently occurring in the area.



2.2 Environmentally Preferable Alternative

In accordance with DO-12, the NPS is required to identify the "Environmentally Preferred Alternative" in all environmental documents, including EAs. According to the CEQ guidelines, the Environmentally Preferred Alternative is the alternative that will promote the national environmental policy as expressed in Section 101 (b) of NEPA, this includes alternatives that:

- fulfill the responsibility of each generation as trustee of the environment;
- ensure for all Americans safe, healthful. Productive and esthetically and culturally pleasing surrounding;
- attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserving important historic, cultural and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice;
- achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities;
- enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources;

Alternative 2 is the environmentally preferable alternative. This alternative is both a restoration effort to repair damage from social trailing and a new trail construction project. The new trail will guide visitors to an area that is less sensitive (away from drainages used as social trails) and will educate visitors. Alternative 2 will cause the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The wayside exhibits associated with the preferred alternative will be used to educate the public about the resources in the area and how management involvement can be used to mitigate unintentional resource damage resulting from social trailing. Additionally, both alternative 3, and the preferred alternative will restore many the social trails. The no action alternative will not provide any positive benefit to the area it this alternative is selected.

Chapter 3 – Affected Environment

This chapter summarizes relevant resource components of the existing environment directly in the project area. It describes environmental components that would be affected by the alternatives, if they were implemented, and provides a baseline against which environmental consequences of the trails realignment plan can be compared. Additional material, specifically related to impacts and effects of the alternatives, is included in Chapter 4, Environmental Consequences.

3.1 General Description of Impact Topics

Joshua Tree National Park is uniquely situated within the Little San Bernardino Mountains within the Transverse Ranges in southern California. Rock types within the park, range in age from 1.3 billion years old to a young 73 million years. The western edge of the park is geologically situated just north of a restraining bend in the San Andreas Fault zone (SAF). Tectonic forces generating rapid up lift (and erosion) in the western portion of the park reveal structurally lower rock type juxtaposed younger emplacement rock types. Weathering throughout the wetter Pleistocene period (now semi-arid throughout Holocene) and the continued dynamic movement of the SAF is responsible for the unique desert landscape of the western portion of the park.

The eastern desert landscape of the park is home to world class alluvial fans contrasted by the rugged Coxcombs and Eagle Mountains. Both the Coxcombs and Eagle Mountains bound the Pinto Basin to the west. Geologically, the Pinto Basin is a semi-playa that depicts lines of evidence of a paleolake or braided stream system and may have been home to some of the areas earliest inhabitants.

Roughly speaking, the western part of the park is considered part of the Mojave Desert. The cooler higher elevations of the Mojave Desert offers a climate commensurate with unique fauna and flora not found in the eastern part of the park. Some of the flora found in the western portion of the park include the iconic Joshua Tree, Pinyon Pine, Junipers, Parry's Nolina and Scrub Oak. Fauna of the Mojave include but not limited to Antelope Ground Squirrel, Desert Woodrat, Yucca Night Lizard, American Kestrel, Loggerhead Shrike and Scott's Oriole.

Eastern portion of the park is situated within the Colorado Desert. The portion of the park is generally lower in elevation and is predominantly drier and several degrees higher in temperature throughout the year. Some of the flora unique to the Colorado Desert include: Smoke tree, Ocotillo, Dune Primrose and Sand Verbenia. The fauna unique to the Colorado Desert includes: Zebratail Lizard, Kit Fox and Western Diamondback Rattlesnake.

A few species are common to both the Mojave Desert and the Colorado Desert; they include the Desert Tortoise, Road Runner, Kangaroo Rats, Red-tailed Hawks, and Ravens. Pencil Cholla and other varieties of cholla can be found across the transition zone between the two deserts as well in both the Mojave and Colorado deserts.

The proximity of the park to the megalopolis of Los Angles and the Coachella Valley offer a variety of recreational activities to visitors located within 150 miles of the park. The dark night sky of the park is beyond the light polluted areas of the city offer unparalleled night sky viewing for both the amateur and professional astronomers. Day hiking and back country hiking are popular activities amongst the 1.4 million visitors to the park.

3.2 Air Quality

The National Park Service has the responsibility to protect air quality under both the Organic Act 1916 and the Clean Air Act as amended in 1990. Accordingly, the Service will seek to perpetuate the best possible air quality in parks to (1) preserve the natural resource and systems; (2) preserve cultural resources; and sustain visitor enjoyment, human health, and scenic vistas in addition to NPS management policies, regional air quality is governed by both the South Coast and Mojave Air Quality Management District's Rule 403 governing the release of fugitive dust. Additionally, Park is a Federal Class I area for national ambient air quality standards (NAAQS); includes wilderness and non-wilderness areas.

Joshua Tree is in non-attainment status regarding NAAQS standards which includes particulate matter 10 microns and smaller (PM10). Daily exceedences of ozone typically occur during the warmer months of the year with reasonably good air quality occurring during the remainder (cooler season) of the year. Visibility (and ozone) throughout the park is generally described as improving to the east. Under the 2008 NAAQS standard Joshua Tree was in attainment of the 8-hr ozone standard at 85ppb1

3.3 Geologic Resources – Soils

The 2006 Management policies directs NPS units as follows: "The service will actively seek to understand and preserve soil resources of parks, and to prevent, to the extent possible , the unnatural erosion, physical removal, or contamination of soil or its contamination of other resources."
Joshua Tree National Park is predominantly located in the eastern portion of the Transverse Ranges further identified as the Little San Bernardino Mountains. The Transverse Ranges are the only east-west mountain ranges in California. The eastern portion of the park, primarily the Coxcombs Mountain range is just outside of the Transverse Ranges and depicts more of a Basin and Range geomorphic topography. The rock type of the park is a mixture of metamorphic rocks, intrusive granitic rocks and older granitic rocks. Much of the Little San Bernardino Mountains rocks have been reset in age to Mesozoic due to magmatic intrusion associated with a subduction zone. The interspersed valleys throughout the park are mantled by poorly consolidated Quaternary deposits.

In arid or semi-arid environments soil development is rare. Soil formation or pedogenic process requires high amounts of precipitation and warm ambient temperatures. Throughout the Holocene to present day much of the southwest was arid to semi-arid preventing the development of true soil through pedogenic process or chemical/biological weathering. Much of what is considered soil in the park are actually Quaternary alluvial deposits consisting of loosely deposited sand and gravel. During 2006 to 2008 the National Resource Conservation Service inventoried soils within the park and provided the park with a preliminary taxonomic classification of soil (alluvium) and occurrence (slope).

In some localities within the park, cryptobiotoic soil crust does exist. These biological organisms are not actually soil but organism living on the alluvial material. These biological crusts are areas of concern and shall be avoided or protected.

3.4 Vegetation

Portions of the proposed trail which are new pass through three vegetation alliances: Juniperus californica / Coleogyne ramosissima Woodland Association (62%), Desert Willow alliance (21%), and Catclaw

[1] PPB-- refers to parts-per-billion.

Acacia-Desert Willow association (17%). All of these alliances are primarily comprised of long lived desert species.

Stands of the Juniperus californica / Coleogyne ramosissima Woodland Association are found at mid to high elevations (3,300–5,100 ft.; 1,000–1,600 m), most frequently on the upper portions of bajadas near the base of mountains and on south-facing mountain slopes. Slopes vary from moderate to steep (6 to 28 degrees). Soil texture ranges from coarse sand to loam. Soils are formed primarily from granitic parent material. The substrate surface consists of 0–20 percent bedrock cover, 0–20 percent boulder cover, 0–20 percent stone cover, 0–25 percent cobble cover, 3–60 percent gravel cover, and 6–82 percent fines cover. Litter cover varies from 0–18 percent. These sites generally experience low to high levels of competition from exotic species. Stands of the Juniperus californica / Coleogyne ramosissima Woodland Association form a sparse to intermittent woodland with 0–19 percent cover for the tree/tall stratum, 6–48 percent cover for the shrub/medium stratum, and 0–64 percent cover for the herb/low stratum. Total vegetative cover ranges from 7–53 percent. This association is dominated by the woody species Juniperus californica and Coleogyne ramosissima. The exotic species Bromus rubens and/or B. tectorum is also dominant in the herb layer. Yucca brevifolia is characteristically present at low cover. Characteristic shrub and herbaceous species include Ephedra nevadensis, Eriogonum fasciculatum, and Yucca schidigera, and Achnatherum speciosum. Cryptobiotic crust is abundant in the understory. Often, Cylindropuntia echinocarpa, Echinocereus engelmannii, Opuntia basilaris, Pleuraphis rigida, and the exotic species Bromus tectorum are found contributing minor cover in this association.

The Desert Willow association is primarily limited to washes of the northern portions of the park. Chilopsis linearis, the desert willow, is the diagnostic species in riparian type alliance. Individual trees are irregularly distributed and generally extremely sparse with extensive portions of the wash corridor lacking species which define the alliance.

Stands of the Acacia greggii - Prunus fasciculata Shrubland Association occur mostly in the western and southwest central portion of the park but also at higher elevations in the eastern part of the park. Stands of Acacia greggii - Prunus fasciculata Shrubland Association are found at mid elevations (3,200 to 5,000 ft.; 975 to 1,500 m) within drainages of washes and bajadas. Microtopography varies and may be convex, linear, concave, or undulating. Soil textures typically range from coarse sand to moderately fine, silty, clay loam. Parent material is typically granitic. The surface in this association is composed of 0–35 percent bedrock, 0–20 percent boulder, 0–6 percent stone, 0–7 percent cobble, 3–56 percent gravel, and 0–80 percent fines cover. Litter cover is 1–35 percent. These sites experience low to high levels of disturbance from competition from exotics (0–6%) and low to moderate levels of disturbance from foot traffic and trampling. Stands of the Acacia greggii - Prunus fasciculata Shrubland Association form an open/sparse shrubland with 0–<1 percent cover at <1 cm tall, <1–6 percent cover at 1–25 cm tall, <1–2 percent cover at 25–50 cm tall, <1–5 percent cover at 50 cm to 1 m tall, 2–13 percent cover at 1-3 m tall and 0–2 percent cover at 3–5 m tall. Total vegetative cover ranges from 4–21 percent. This association is dominated by the shrub species Acacia greggii, Prunus fasciculata, Hymenoclea salsola, and Salazaria mexicana. The understory herb layer is dominated by the exotic species Bromus madritensis. Characteristic shrub species include Eriogonum fasciculatum, Opuntia echinocarpa, and Yucca schidigera. The exotic species Erodium cicutarium is characteristically present in the herb layer. Ephedra nevadensis, Mirabilis bigelovii, Simmondsia chinensis, Viguiera parishii, and Lycium sp. frequently contribute minor cover.

See below for additional information on the state listed Coryphantha alversonii.

3.5 Wildlife

Large mammals known to occur within or adjacent to the project area include the desert bighorn sheep (Nelson's; Ovis canadensis nelsoni), mule deer (Odocoileus hemionus fuliginatus), and mountain lion (Felis concolor californica). Coyote (Canis latrans mearnsi) and bobcat (Lynx rufus baileyi) are also known to occur in the vicinity of the project area.
Small mammals known to occur within or adjacent to the project area:

Chaetodipus fallax pallidus - pallid pocket mouse

Chaetodipus formosus mohavensis - Mojave long-tailed pocket mouse

Chaetodipus penicillatus angustirostris - narrow-nosed pocket mouse

Chaetodipus spinatus spinatus - eastern spiny mouse

Dipodomys deserti deserti - desert kangaroo rat

Dipodomys merriami merriami - Merriam's kangaroo rat

Perognathus longimembris longimembris - Mojave little pocket mouse

Neotoma lepida lepida - desert wood rat

Onychomys torridus pulcher - desert grasshopper mouse

Peromyscus crinitus stephensi - desert canyon mouse

Peromyscus eremicus eremicus - cactus mouse

Peromyscus maniculatus sonoriensis - Sonoran deer mouse

Ammospermophilus leucurus leucurus - white-tailed antelope squirrel

Spermophilus tereticaudus tereticaudus - Mojave round-tailed ground squirrel

Tamias obscurus davisi - dusky chipmunk

Thomomys bottae rupestris - Coachella Valley pocket gopher

Spilogale gracilis gracilis - western spotted skunk

Taxidea taxus berlandieri - desert badger

Sylvilagus audubonii arizonae - southern desert cottontail

Lepus californicus deserticola - desert black-tailed jackrabbit

Vulpes macrotis arsipus - desert kit fox

Urocyon cinereorgenteus scottii - desert gray fox

Approximately a dozen species of bats inhabit the park (Brown 1993). Bat species known to occur in the vicinity of the project area include:

Antrozous pallidus minor - pallid bat

Eptesicus fuscus pallidus- desert big brown bat western yellow bat

Lasiurus xanthinus - western yellow bat California desert bat

Myotis californicus stephensi - California desert bat

Pipistrellus hesperus Hesperus - western pipistrelle

Eumops perotis californicus - western mastiff; De Lisle 2003

Reptile species known to occur within or adjacent to the project area:

Coleonyx variegates variegates - desert banded gecko

Dipsosaurus dorsalis dorsalis - desert iguana

Crotaphytus bicinctores - Great Basin collared lizard

Gambelia wislizenii wislizenii - long-nosed leopard lizard

Sauromalus obesus obesus - western chuckwalla

Callisaurus draconoides rhodostictus - Mojave zebra-tailed lizard

Phrynosoma platyrhinos calidiarum - southern desert horned lizard

Sceloporus magister uniformis - yellow-backed spiny lizard

Uma scoparia - Mojave fringe-toed lizard

Urosaurus graciosus graciosus - western brush lizard

Uta stansburiana elegans - California side-blotched lizard

Xantusia vigilis vigilis - desert night lizard

Cnemidophorus tigris tigris - Great Basin whiptail

Leptotyphlops humilis cahuilae - desert blind snake

Lichanura trivirgata gracia - desert rosy boa

Arizona occidentalis candida - Mojave glossy snake

Arizona occidentalis eburnata - desert glossy snake

Chionactis occipitalis occipitalis - Mojave shovel-nosed snake

Hypsiglena torquata deserticola - desert night snake

Lampropeltis getula californiae - California kingsnake

Masticophis flagellum piceus - red coachwhip

Phyllorhynchus decurtatus perkinsi - western leaf-nosed snake

Pituophis catenifer affinis - Sonoran gopher snake

Pituophis catenifer deserticola - Great Basin gopher snake

Rhinocheilus lecontei lecontei - western long-nosed snake

Salvadora hexalepis hexalepis - desert patch-nosed snake

Salvadora hexalepis mojavensis - Mojave patch-nosed snake

Trimorphodon biscutatus vandenburghi - California lyre snake

Crotalus atrox - western diamondback rattlesnake

Crotalus cerastes cerastes - Mojave Desert sidewinder

Crotalus mitchelli Pyrrhus - southwestern speckled rattlesnake

According to the bird checklist for the park, approximately 239 species of birds have been reported. Species likely to occur within the project area include, but are not limited to, various hawks, vultures, falcons, quail, doves, owls, hummingbirds, woodpeckers, flycatchers, ravens, wrens, and sparrows.

3.6 Federally Listed Species

Under the ESA of 1973, as amended, an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range. Section 7 of the ESA directs all federal agencies to use their existing authorities to conserve threatened and endangered species and, in consultation with the USFWS, to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat.

Six federally listed species are known to occur within the park. These include the Mojave population of the desert tortoise, least Bell's vireo (Vireo bellii pusillus), Southwestern willow flycatcher (Empidonax traillii extimus), Parish's daisy (Erigeron parishii), triple-ribbed milk-vetch (Astragalus tricarinatus), and Coachella Valley milk-vetch (Astragalus lentiginosus coachellae). Only the desert tortoise is known to occur within the project area. The remaining five federally listed species known to occur within the park are not expected to occur within the project area due to lack of suitable habitat.

Critical habitat has been designated for the desert tortoise within the park. The entire park is designated as

a Desert Wildlife Management Area, and all suitable habitats for the desert tortoise in the park should be considered critical habitat. The entire trail project slated for reconstruction is located within moderate to low quality desert tortoise habitat. The quality of the habitat is determined from statistical modeling (Nussear et al 2009) and from the soil and terrain characteristics of the site. The proposed trail traverses areas that are sandy washes and areas of exposed bedrock. Both of these substrate types are not conducive to desert tortoise due to difficulty of burrow construction. However, tortoises have been reported in and around the proposed trail construction.

Nelson's bighorn sheep are one of three subspecies of bighorn sheep in California. Nelson's bighorn sheep are listed as BLM sensitive species in California, primarily due to their low numbers and sensitivity to human disturbance. This subspecies occurs in desert mountain ranges from the White Mountains of Mono and Inyo counties south to the San Bernardino Mountains, and southeastward to the United States–Mexico border. Bighorn sheep prefer open areas of low-growing vegetation for feeding, with close proximity to steep, rugged terrain for escape, lambing, and bedding, and adequate source of water, and travel routes linking these areas. Bighorn sheep have been frequently see in the rocky areas just north of the proposed trail construction area.

The loggerhead shrike is listed as a California Species of Special Concern and is a year-round resident in the park. This species inhabits most of the continental United States and Mexico and is a year-round resident of southern California. The loggerhead shrike prefers open habitat with perches for hunting and fairly dense shrubs for nesting (Yosef 1996). In southern California, loggerhead shrikes inhabit grasslands, agricultural fields, chaparral, and desert scrub (Unitt 2004). Their breeding season is from March to August. Loggerhead shrikes are highly territorial and usually live in pairs in permanent territories (Yosef 1996). Loggerhead shrikes feed on small reptiles, mammals, amphibians, and insects that they often impale on sticks or thorns before eating. Loggerhead shrike populations are declining, likely due to urbanization and loss of habitat and, to a lesser degree, pesticide use (Yosef 1996). Loggerhead shrikes have been seen in the area near Skull rock.

Bendire's thrasher is listed as a California Species of Special Concern. This species is a very local spring and summer resident and breeder found within flat areas of desert succulent shrub and Joshua tree habitats of the Mojave Desert area. Bendire's thrasher is a migrant known to occur in San Bernardino County and western Kern County in California primarily from February to around August, although they can be present year round. This thrasher frequents flat desert areas with scattered stands of thorny shrubs and cactus for cover, foraging, and nesting. Potentially serious threats to this species include harvesting of Joshua tree (Yucca brevifolia) and other yuccas, grazing by domestic livestock, urbanization, and off-road vehicle activity within its limited breeding range (California Department of Fish and Game 2005a).

Alverson's foxtail cactus (Coryphantha alversonii). The Alverson's foxtail cactus is listed by the California Native Plant Society as a rare plant with a 4.3 ranking (uncommon; not very endangered in California). This species is found in Imperial, Riverside, and San Bernardino counties. Alverson's foxtail cacti are primarily found in sandy or rocky (usually granitic) habitats of Mojavean and Sonoran desert scrub. The California ranking for this species is vulnerable and threatened (California Native Plant Society 2010b). Numerous Alverson's foxtail cacti were observed during the natural resources surveys conducted from January 10 to May 21, 2014 (Personal observation, Hoines 2014).

3.7 Cultural Resources

The National Historic Preservation Act of 1966 (as amended), NEPA, the Native American Graves and Repatriation Act of 1990, NPS Management Policies, NPS-2 (Planning Process Guideline), and NPS-28 (Cultural Resource Management Guidelines) call for the consideration of archeological, historic, ethnographic, and other cultural resources in planning proposals and undertakings. The park's NHPA section 106 responsibilities have been specifically addressed in a separate document (Marrs and Dollinger 2013) but will also be summarized herein.

At the time of European contact, the boundaries of three Native American groups – the Cahuilla, Chemehuevi, and Serrano – intersected at a point now in the park. The Cahuilla occupied southern and southwestern portions of the park; the Chemehuevi eastern portions; and the Serrano, northern and northwestern portions, including the area now known as Indian Cove (Bean and Vane 2002). The Mojave utilized the eastern areas of the park and were also known to travel through the park on a regular basis. Descendants of these peoples continue to live in the region and maintain cultural interests in the park. The possibility exists of sacred sites being identified within the park which would make consultation necessary. The major ongoing Native American concern relates to the possibility of discovering human remains; cremations have been found in the park in the past (Schroth 1992). The need would then exist to follow through with prompt notification and consultation with the neighboring tribes. The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), which would govern any future NPS action, in this regard.

Archeological and historic resources in the region of Joshua Tree National Park may reflect as much as 10,000 years of human use and occupation (NPS 1996). Examples in the literature include NPS reports of 1975, 1985, and 1992. Other works are those of Elizabeth Campbell (1931), Elizabeth Campbell and William Campbell (1935), William Wallace (1964), Claude Warren and Joan Schneider (1993, 2000), Adella Schroth (1994), Loy Neff (2002), Loy Neff and Meredith Wilson (2004), and Mike Newland and Philip Kaijankoski (2013).

The ethnography and ethnohistory by Bean and Vane (2002) provides a general overview of Native American ethnohistorical connections to the Park and ethnographically significant animal and plant resources. Bean and Vane (2002) focus on subsistence resources and general material culture that includes a wide array of resources present within the project area. Although general food resources exist in the project area, no ethnographic resources of significant concern have been identified in the area of potential effect. The ethnographic resources of primary concern to associated Native American communities included certain rock art resources, raptor nesting sites, and significant religious localities, none of which have been identified in the project area.

Background

Evidence of human occupation in the area currently known as Joshua Tree National Park reliably dates from the late Pleistocene, approximately 10,000 years ago, until the present (Newland and Kaijankoski 2013).

Paleo-Indian Period (ca 10,000-8,000 years Cal B.C.)

This period is poorly represented within the park with just a few radiocarbon dates taken from Olivella sp. shells in the Pinto Basin Area during A. Schroth's study of sites along the prehistoric river banks (1994).

During the Paleo-Indian period, groups were likely taking advantage of the remaining Pleistocene faunal drawn to the perennial water available in the Pinto Basin (Warren 1984). A fluted point was recovered on the Marine Corps Air Ground Combat Center north of the park during survey work in 2014 (R. Byerly, Far Western Anthropological Research Group, Inc., personal communication, August 20, 2014). The presence of Paleo-Indian materials immediately north of the park offers tantalizing possibilities for future discoveries within the park's boundaries.

Lake Mojave Complex (ca 8,000-6,000 Cal B.C.)

The Lake Mojave Complex represents the first clearly defined occupation of the region with substantially documented archeological resources (Newland and Kaijankoski 2013). The type site for this complex is located approximately 80 miles north of Joshua Tree National Park along the shores of the now desiccated Pleistocene-Early Holocene Lake Mojave. Great Basin stemmed projectile points, bifaces, steep-edged unifaces, crescents, cobble-core tools and groundstone artifacts characterize this complex. Relatively high frequencies of non-local stone types suggest that tools were transported significant distances and used for long periods of time. The relative absence of obsidian and cryptocrystalline silicates suggests that other lithic materials were preferred. Available data indicate that Lake Mojave complex peoples utilized a wider range of resources over a broader area than previously recognized (Newland and Kaijankoski 2013). Minimal wear to groundstone artifacts suggests that hard-seed processing was not extensive and people relied more heavily on vegetal resources that required little preparation. Excavations at Fort Irwin by Basgall (1993, in Sutton et al. 2007:237) revealed a heavy reliance on small game, but this seems at odds with the preponderance of large projectile points, bifaces, and scrapers characterizing most sites. To date no Lake Mojave complex sites have been identified within the park, but they are documented in Twentynine Palms. There appears to be a gradual transition from Lake Mohave to Pinto complexes in the area, however overlapping obsidian hydration and radiometric dates in addition to the co-occurrence of stemmed and Pinto points at some sites suggest a more complicated process of social change.

Pinto Complex (ca 8,400-3,000 Cal B.C.)

The Pinto complex is the most widespread cultural expression in the Mojave Desert region during the Middle Holocene, lasting for at least 5,000 years. This period represents human adaptation to a climatic transition period shifting from a wet and rainy climate to arid conditions similar to what we see today. Groups were shifting not only from hunting of large Pleistocene mammals to hunting smaller game, but the importance of gathering floral resources also gains importance during this time. Artifacts from this time period include Pinto Series points, drills, leaf-shaped bifaces, scrapers, drills, pestles and handstones, knives and slab metates (Newland and Kaijankoski 2013, Warren 1984). Lithic experts suggest that Pinto points were heavily reworked and may have been used at the thrusting end of a spear rather than as a dart point (Newland and Kaijankoski 2013). Pinto complex peoples used a narrower range of toolstone materials, suggesting a smaller foraging range and wider subsistence base with an increased reliance on small game and vegetal resources. The presence of Olivella shell beads indicates that Pinto complex people were not living in isolation and did maintain contact and trade networks with coastal populations. Pinto sites are relatively large but were probably occupied seasonally as game and ripening vegetal material became available. As opposed to Lake Mojave complex sites that appear to have witnessed repeated short-term use and a narrow range of activities, Pinto complex sites appear to represent a broader range of activities as represented by more artifact types. Abundant milling features and artifacts coupled with substantial midden deposits suggest longer-term, more permanent settlements functioning as base

camps from which hunting and gathering parties could access a wide range of resource areas. Currently known Pinto sites within the Park are found primarily in lower elevations associated with pluvial lakes or river systems and water resources (Newland and Kaijankoski 2013).

Deadman Lake Complex (ca 7,000-3,000 Cal B.C.)
The Deadman Lake complex co-occurs with the later part of the Pinto complex and has only been identified in the Twentynine Palms area (Sutton et al. 2007). This complex appears to represent a separate cultural expression that completely lacks the Pinto-series points, but instead utilizes small to medium contracting stem and leaf-shaped points. Deadman Lake complex sites are found at higher elevations than the basin-focused Pinto sites. This raises the question of whether the Deadman Lake complex represents two different cultures occupying different altitudes and exploiting different resources within the same region, or a different tool kit of the Pinto complex used at higher elevations. Moderate amounts of groundstone and an abundance of battered cobbles and cobble tools suggest crushing and pulping of an as-of-yet unidentified vegetal resource at Deadman Lake sites. Recovered faunal materials indicate a focus on small game, but vegetal resources probably received the greatest attention. Deadman Lake complex sites are associated with alluvial fans and piedmonts overlooking higher-altitude pluvial lake beds, which are only found in a few locations throughout the Park (Newland and Kaijankoski 2013).

Gypsum Complex (ca 2,000 Cal B.C. to Cal A.D. 200)
The beginning of the Gypsum complex coincides with the beginning of the Little Pluvial around 4,000 years ago and continues the increased aridity of the area. The Gypsum complex may well represent the first true desert resource adaptation compared to earlier cultural complexes focused on dwindling pluvial lakes and water resources (Newland and Kaijankoski 2013). Three new projectile point styles arise during this period including concave-base Humboldt series, Gypsum point series, and the corner-notched Elko series. This period also continues the trend of a diversification of tool assemblages and the ubiquity of groundstone artifacts at sites (Sutton et al. 2007, Warren 1984). Gypsum complex sites are numerous outside the park and throughout the northern and western Mojave Desert. Warren and Scheider (2000) did not identify any Gypsum complex sites during their random-sample inventory and no other surveys have conclusively identified this cultural complex within the Park. Very few sites attributed to the Gypsum complex are known in the southern and eastern portions of the Mojave Desert (Sutton et al. 2007), yet there are well-defined archeological deposits dating to this time period south of the Park in San Diego County and near the Palm Springs area (Schaefer and Laylander 2007).

Rose Spring Complex (ca Cal A.D. 200-1100)
This period is marked by the presence of the Rose Spring and Eastgate projectile point types and the introduction of ceramics. The lithic assemblage is much the same as the preceding Gypsum Period with bifaces becoming less common. Early ceramic types include grayware, black-on-gray, and brownware ceramics (Sutton et al. 2007, Warren 1984). The bow and arrow was introduced during this period and the shift away from the atlatl is evident in projectile points and rock art (Sutton et al. 2007). The expansion in types and varieties of artifacts and increase of well-developed midden is taken as evidence of a rapidly growing population. Site locations tend to focus on immediate access to water sources, such as springs, washes, and lakeshores. Architecture is more prevalent within sites, possibly reflecting more intensive, long-term occupations, smaller land-use areas, and fewer, shorter movements compared to larger foraging areas.

The Medieval Climatic Anomaly (MCA) dramatically affected Rose Spring complex peoples. The desiccation of lakes and other water sources forced populations to relocate to more ephemeral water sources. The decline of juniper and pine species and increase in mesquite forced a change in subsistence focus, resource acquisition, and processing methods. The continued decline of available large mammals led to an increased reliance on small game. The time period of the MCA also witnesses the reversal of the trend towards larger, more permanent settlements and an increase in smaller habitation sites.

Protohistoric Period (ca Cal A.D. 1100 to Contact)
There is little change from the preceding period with tool assemblages continuing to represent a mixed subsistence strategy of hunting and gathering utilizing a nomadic lifestyle. It is during this time that the Desert Side-notched Point appears as well as paddle-and-anvil ceramics. It is during this period we see the introduction of solstice markers recognizing the importance of the seasons for gathering and possible limited horticultural utilization (Sutton et al. 2007, Warren 1984). The introduction of new technologies is interpreted as the result of large-scale population shifts across the Mojave and Colorado Deserts. The ethnographic groups encountered at the time of contact are believed to have emerged during this time period with Yuman-speaking groups moving across the Colorado into the southern Mojave Desert possibly bringing agricultural practices with them and Numic-speaking Shoshone and Paiute moving eastward through the Mojave. The Chemehuevi, Cahuilla, and Serrano all have deep cultural ties to the park and the larger area that extend far beyond this summary account.

Historic Period
The Spanish were the first Europeans to explore California, with first contact made by Francisco Garces, a Spanish missionary who encountered the Chemehuevi and Serrano in 1776. The Spaniards led two more expeditions through the park and may have established mines in the area following initial contact. The next period of Euro-American activity in the park area is during the American Expansion occurring in the second half of the nineteenth century. The American miners were the first to establish known mines within the park boundary in 1865. By 1900 there were 25 mining claims in and around the park, with mining continuing in the park until the 1950's. Contemporaneous with mining in the park was the use of lands for ranching, establishing developed tanks throughout the area and grazing over vast territory. A drought in the 1930's undermined the cattle industry and land was quickly seized by homesteaders before ranchers could recover. Grazing was finally prohibited within the monument after World War II (Greene 1983). Historic resources abound within the park, primarily relating to mining and grazing in the first half of the twentieth century.

Cultural Resources in the Skull Rock Area
Specific archeological work and historic resources surveys dealing with the Skull Rock area include those of Kay Simpson (1981), Jan Keswick (2000), Loy Neff & Christopher Corey (2004), Lynn Robinson (2006), and Caitlyn Marrs & Samantha Dollinger (2013). Bean and Vane (2002) provide an overview of Native American ethnohistorical connections to the Park and ethnographically significant animal and plant resources that can be generally applied to the Skull Rock area.

Native American occupation in the Skull Rock area primarily falls in the late prehistoric period, from about A.D. 1000 to perhaps historic times. Camps and rock shelters comprise the range of habitation sites. Other site types include food processing areas, lithic and pottery scatters, and rock art. The park is well known for its pottery finds, including intact vessels discovered in caves and crevices that served as food

and water caches. Historic metal cans and fragments of metal, glass, and other historic items are found throughout the park. Historic isolates have been documented in the project area, but will not be affected by this undertaking.

There are five previously recorded archaeological and historic sites (CA-RIV-6481H, CA-RIV- 7168H, CA-RIV-00936, CA-RIV-01962, CA-RIV-01963) and 22 isolated artifacts in the Skull Rock area. None of the archeological sites are within the area of potential effect for this project. Four archeological surveys were previously conducted in the area (JOTR 1979A, 2000D, 2001A, 2006F). Three isolated artifacts were identified during previous surveys immediately outside of the area of potential effect. A single milling slick feature was recorded during the 2013 survey. The milling slick is located approximately 20 meters west of the trail. This project is unlikely to affect this resource in any appreciable manner. The known archaeological sites within one kilometer of the project area are described below. All of the sites fall outside of the area of potential effect of this project.

Table 1: Previously Recorded Archaeological Sites

Site Number	Description
CA-RIV-00936	Small mouthed olla cache found in a rock crevice.
CA-RIV-01962	A 3-4 course rock wall in between 2 boulders and an historic petroglyph.
CA-RIV-01963	A rock shelter with a one course high rock wall and a small sherd scatter on the floor.
CA-RIV-6481H	An historic cement watering trough with a metal pipe leading to an excavated spring, known as Desert King Spring.
CA-RIV-7168H	An historic cement and rock dam and reservoir, known as Live Oak Tank. A prehistoric millslick is nearby.

Chapter 4 – Environmental Consequences

This chapter analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing the trail realignment plan, including the No-Action Alternative. Topics analyzed in this chapter include soils, vegetation, visitor use and experience and cultural resources.

4.1 General Methodology for Analyzing Impacts:

The environmental consequences for each impact topic were defined based on the following information regarding: context, type of impact, area of impact and the cumulative context.

Context: setting within which impacts are analyzed – such as the project area or region, or for cultural resources the area of potential effect.

Type of Impact: describes the classification of the impact as beneficial or adverse, direct or indirect. The terms "impact" and "effect" are used interchangeably throughout this EA.

- Beneficial: An impact that would result in a positive change to the resource when compared to the existing conditions.
- Adverse: An impact that causes an unfavorable result to the resource when compared to the existing condition.
- Direct: Impacts that would occur as a result of the proposed action at the same time and place of implementation (40 CFR 1508.8).
- Indirect: Impacts that would occur as a result of the proposed action, but later in time or farther in distance, but still reasonably foreseeable from the action (40 CFR 1508.8).

Duration of the Impact:

- Short-term: impacts generally last only during the initiation and implementation of the project, and the resources resume their pre-project conditions following the implementation of the project.
- Long-term: impacts last beyond the initiation and implementation of the project, and the resources may not resume their pre-project conditions for a longer period of time.

Intensity: this refers to the severity of the impact. The following should be considered in evaluating intensity:

- Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by

breaking it down into small component parts.

- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
- The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
- Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the impact.

Cumulative Impact Scenario Analysis Methodology

CEQ regulations require the assessment of cumulative impacts in the decision making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and action alternatives.

Cumulative impacts were determined by combining the impacts of the action alternatives with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at the Monument and, if applicable, the surrounding region.

Past actions that have impacted the area where the trails are located include impacts to the soil and geologic features (rocks). In the past substantial rock removal techniques were used the create trails throughout the park. This type of removal (unless safety related) is discouraged and will not be employed with this trail installation. While some rock removal is inevitable the majority of removal will be for safety related issues. A similar approach will be applied to the soil removal associated with this project.

For each impact topic analyzed, an assessment of the potential significance of the impacts according to context, intensity and duration is provided in the “conclusion” section that follows the discussion of the impacts under each alternative. Intensity of the impacts fully considers the relevant factors from the list above. Intensity factors that do not apply to a given resource topic and/or alternative are not discussed.

4.2 Air Quality

Alternative 1- No Action Alternative

There would be no direct impact to Air Quality under Alternative 1 – No Action Alternative.

Alternative 2- Preferred Alternative

Under this alternative, there will be 6/10 of a mile of new ground disturbance. Under this alternative there exists the potential to generate some fugitive dust as a result of implementing the project. During construction of the new tread surface for the trail and during excavation for the wayside exhibits some dust may become airborne. One mitigation measure that may be employed with selection of this alternative is to prohibit construction on windy days or when visible particulates become suspended during construction of the new trail. One other mitigation measure may be to limit construction to a time frame when either monsoon or winter seasonal precipitation has reduced the potential for fugitive dust transport. Other mitigations like using water to control fugitive dust were examined but deemed

impractical to carry large quantities of water out on the trail.

Alternative 3 - Action Alternative without Educational Exhibits
The environmental consequences with- respect to air quality- under this alternative are similar to the preferred alternative. It is anticipated that less fugitive dust would be generated under this alternative due to less ground disturbance. However, mitigation measures would be the same under this alternative.

4.3 Geologic Resources - Soils

Alternative 1 – No Action Alternative
There would be no direct impact to soils under Alternative 1 – No Action Alternative. However, while there would be no direct impact to soils under Alternative 1 there could be some indirect impacts through continued social trailing throughout the area. Having a loop trail with a beginning and an end destination may direct visitor use to stay within to complete the loop. As previously mentioned social trailing throughout the area is fairly extensive and no rehabilitation of social trails is proposed with the No-Action Alternative.

Alternative 2- Preferred Alternative
Under this alternative, there will be 6/10 of a mile of new ground disturbance. However, this alternative is proposed to help direct visitors to stay on the trail and not cut across the natural areas between the vegetation and wild life habitat. This alternative also included the rehabilitation of the social trails previously mentioned. In addition to the rehabilitation of the social trails and educational component (exhibits) is planned to discuss the benefits to the soil resource by directing visitors to stay within the limits of the trail.

Alternative 3 - Action Alternative without Educational Exhibits
Under this alternative, there will be 6/10 of a mile of new ground disturbance. Similar to Alternative 2 the main objective is to direct visitors to stay within the established trail. This will minimize the social trail throughout the area. There would be less ground disturbance with this alternative because of the lack of excavations for the educational exhibits.

4.4 Vegetation

Alternative 1 – No Action Alternative
There would be no additional impacts to vegetation as a result of Alternative 1. However, it would be assumed that social trails would continue to be used in the area that would have indirect impacts to the vegetation.

Alternative 2 – Preferred Alternative
Given the sparse nature of the vegetation communities in the area, impacts to vegetation will be minimal and may involve trimming of branches. Field surveys indicate enough room exists between plants that the trail could be constructed to avoid removal of plants. New disturbance and visitors to this location may bring additional pressure from invasive plants, however invasive bromes were observed within the area surrounding the trail and additional importation of invasive grass seed may be negligible when compared to on site reproduction.

Alternative 3 – Action Alternative without Educational Exhibits
There would be little additional impact to Vegetation compared to alternative 2 with the installation of interpretive signage as described in Alternative 3.

4.5 Wildlife

Alternative 1 – No Action Alternative
There would be no additional impacts to wildlife as a result of Alternative 1. However, it would be assumed that social trails would continue to be used in the area that would have indirect impacts to the wildlife.

Alternative 2 – Preferred Alternative
Wildlife can be impacted by noise which can disrupt breeding and nesting as well as cause wildlife to avoid an area during noise events. The noise of construction cannot be mitigated but the timing can be altered to avoid impacting sensitive species if necessary.
The impacts to wildlife as a result of Alternative 2 would be short term and primarily due to noise (hand tools) during the trail construction phase. This noise would be confined to daytime (work) hours. Trail construction outside of the spring season would avoid the breeding season of many of the resident birds and other wildlife.

Alternative 3 – Action Alternative, without Educational Exhibits
There would be little additional impact to wildlife compared to alternative 2 with the installation of interpretive signage as described in Alternative 3.

4.6 Federally Listed Species

Alternative 1 – No Action Alternative
There would be no additional impacts to federally listed species and species of special concern as a result of Alternative 1. However, it would be assumed that social trails would continue to be used in the area that would have indirect impacts to these species.

Alternative 2 – Preferred Alternative
Wildlife can be impacted by noise which can disrupt breeding and nesting as well as cause wildlife to avoid an area during noise events. The noise of construction cannot be mitigated but the timing can be altered to avoid impacting sensitive species, if necessary.

The impacts to special status wildlife as a result of Alternative 2 would be short term and primarily due to noise (hand tools) during the trail construction phase. This noise would be confined to daytime (work) hours. Trail construction outside of the spring season would avoid the breeding season of many of the resident birds and other wildlife.

Desert tortoises may be present in the area slated for trail construction. However, due to the poor quality of substrate needed to construct burrows, it is unlikely that any tortoise or burrows will be affected by this project. Personnel working on the project must avoid tortoise and tortoise burrows and be familiar with desert tortoise. The park has an educational program to ensure that workers on the project are aware of the tortoise and what to do if one is encountered.

The construction of the trail will clear plants that may be important as forage for tortoises in the area. However, with the reduction and rehabilitation of social trails in the area, the overall impact to forage plants important to the tortoise will be minimal.

Considering all of the impacts from trail construction, coupled with social trail rehabilitation, it is expected that the impact to the desert tortoise and all other special status wildlife will be negligible.

Impacts to special status vegetation
Less than 20 *Coryphantha alversonii* individuals were observed within the corridor of the new trail. Given the sparse distribution of foxtail cactus, impacts to the population will be minimal and individuals could be avoided during construction.

Alternative 3 – Action Alternative without Educational Exhibits
There would be little additional impact to federally listed species and species of special concern compared to alternative 2 without the installation of interpretive signage as described in Alternative 3.

4.7 Cultural Resources

Archeological Resources

Alternative 1 – No Action
There would be little additional impacts to archeological resources as a result of Alternative 1. However, it would be assumed that social trails would continue in the area and isolated archeological and historic artifacts could be lost to theft or vandalism.

Alternative 2 – Preferred Alternative
Subsurface archeological resources can be affected by ground disturbing activities. The installation of a 1” deep by 24” wide trail surface has the potential to have an adverse effect on presently unidentified, buried archeological resources. The documented distribution of isolated artifacts following five separate archeological surveys indicates a low potential to disturb buried archeological deposits.
The installation of educational exhibits has the potential to impact buried archeological deposits through the excavation of post holes. The limited area of disturbance does not pose a significant threat to potentially buried archeological resources. The available archeological data from previous surveys indicates a low potential to disturb buried archeological resources. This alternative has a minor potential to have a negligible adverse effect on archeological resources.

Alternative 3 – Action Alternative without Educational Exhibits
There would be no additional impacts to archeological resources compared to alternative 2. Excluding the installation of educational exhibits would negligibly reduce the potential to impact buried archeological resources.

Historic Resources

Alternative 1 – No Action
There would be little additional impacts to historic resources including historic artifacts and nearby historic water impoundments and troughs as a result of Alternative 1. However, it would be assumed that

social trails would continue in the area and isolated historic artifacts could be lost to theft. Historic resources in the area could suffer additional impacts from graffiti and vandalism if social trails continue to proliferate and provide unimpeded access.

Alternative 2 – Preferred Alternative
There would be little additional impacts to historic resources as a result of Alternative 2. There is very little potential for buried historic resources in this type of depositional environment. The elimination of social trails may have a beneficial effect on historic resources by restricting visitor access to them and reducing impacts from theft of artifacts and vandalism to historic impoundments and watering troughs in the area.

Alternative 3 – Action Alternative without Educational Exhibits
There would be no additional impacts to historic resources compared to Alternative 2.

Ethnographic Resources
Alternative 1 – No Action
There would be little additional impacts to ethnographic resources as a result of Alternative 1. There are no documented ethnographic resources in the area of potential effect except for plant and potential food resources. The continued proliferation of social trails has the potential to adversely affect presently unidentified ethnographic resources of interest to associated Native American communities.

Alternative 2 – Preferred Alternative
There would be no additional adverse effects to ethnographic resources as a result of Alternative 2. The elimination and revegetation of social trails has the potential to have a beneficial effect on ethnobotanical resources. Eliminating social trails and focusing visitor impacts to a reduced area can potentially protect presently unidentified ethnographic resources within the project area.

Alternative 3 – Action Alternative w/o Educational Exhibits
There would be no additional impacts to ethnographic resources compared to Alternative 2.

4.8 Consultation and Coordination

Indian Tribes
Agua Caliente Band of Cahuilla Indian, Palm Springs Cabazon Band of Cahuilla Mission Indians, Indio, CA Chemehuevi Indian Tribe, Havasu, CA
Colorado River Indian Tribe, Parker, CA Fort Mojave Indian Tribe, Needles, CA
Morongo Band of Cahuilla Mission Indians, Banning, CA Torres- Martinez Band of Mission Indians, Thermal, CA Twentynine Palms Band of Mission Indians, Coachella, CA

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List of Recipients

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service, Ventura and Reno Offices
National Park Service, Mojave National Preserve
Bureau of Land Management, Palm Springs, CA

Indian Tribes

Agua Caliente Band of Cahuilla Indian, Palm Springs Cabazon Band of Cahuilla Mission Indians, Indio, CA Chemehuevi Indian Tribe, Havasu, CA
Colorado River Indian Tribe, Parker, CA Fort Mojave Indian Tribe, Needles, CA
Morongo Band of Cahuilla Mission Indians, Banning, CA Torres- Martinez Band of Mission Indians, Thermal, CA Twentynine Palms Band of Mission Indians, Coachella, CA

State and Local Agencies

California Department of Fish and Game California
Department of Transportation
Joshua Tree Municipal Advisory Council City of Twentynine Palms
Town of Yucca Valley
California Welcome Center, Yucca Valley, CA

Organizations

National Park Conservation Association
Cultural Committee of Colorado River Indians
National Hispanic Environmental Council
Sierra Club, Palm Springs, CA
Sonoran Institute, Tucson, AZ

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